

REMARKS

Claims 1-11, 14-17, 19-29, and 32-52 are pending for consideration. In view of the following remarks, Applicant respectfully requests that this application be allowed and forwarded on to issuance.

§101 Double Patenting Rejection

Claims 1-2, 6-14, 18, 22-23, 27-34, 38-44 and 48-52 were provisionally rejected in the Office Action under 35 U.S.C. §101 as claiming the same invention as that of claims 1-34 of U.S. Patent Application Serial No. 10/661,343. Also, claims 3-5, 15-17, 19-21, 24-26, 35-37 and 45-47 were provisionally rejected under the doctrine of obviousness-type double patenting over the same '343 application claims.

The '343 application, however, was expressly abandoned in December 2003. A telephone conversation on July 28, 2005 with the Examiner confirmed that the Express Abandonment filing was incorrectly logged by the Patent and Trademark Office, and the Office accordingly did not show the application as abandoned at the time of the Office Action. Therefore, this obviates this rejection.

§ 102/103 Rejections

Claims 1-2, 7-14, 18, and 27-31 stand rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,476,807 to Duluk, Jr. et al. (hereinafter "Duluk").

Claims 3-6, 15-17, 19-26 and 32-40 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Duluk.

The Claims

Claim 1 has been amended, and as amended recites a method comprising [added language appears in the bold italics]:

- sorting, using multiple depth buffers, depth data associated with multiple transparent pixels that overlie one another to identify an individual pixel that lies closest to an associated opaque pixel;
- computing a transparency effect of the identified pixel relative to the associated opaque pixel; and
- after said computing, identifying a next closest transparent pixel relative to the opaque pixel and computing, for the next closest pixel, a transparency effect relative to the transparency effect that was just computed; and
- *wherein said sorting comprises flipping which of the multiple buffers is considered as a destination buffer and a source buffer*

In making out a rejection of claim 1, the Office argues that Duluk discloses all of the recited features of the claimed subject matter. This claim has been amended to include some of the subject matter of dependant claim 6. Specifically, the claim has been amended to recite that the sorting comprises flipping which of the multiple buffers is considered as a destination buffer and a source buffer.

In light of the current amendments, the Applicant respectfully traverses the Office's rejections.

Duluk does not teach or disclose flipping buffers as claimed. In rejecting claim 6, the subject matter of which is now incorporated into this claim, the Office cites lines 7-25 of column 16, line 55 of column 32 to line 41 of column 33 and line 42 of column 48 to line 35 of column 49, and argues that Duluk teaches flipping because "Zfar and Znear buffers' roles are switch during sorting." (Office Action dated 06/28/05, p. 5).

Applicant respectfully disagrees and submits that Duluk does not teach or suggest *flipping* which of the multiple buffers is considered as the destination buffer and the source buffer as recited in this claim. A portion of the excerpt cited by the Office from column 33 of Duluk is reproduced below for the convenience of the Office (emphasis added):

Duluk Column 33, Lines 23-41

In back-to-front sorted transparency mode, for any particular tile, the number of transparent passes is equal to the number of visible transparent surfaces. The passes can be done as:

a) The Opaque Pass (there is only one Opaque Pass) does the following: the *front-most opaque geometry is identified (labeled Zfar)* and sent down the pipeline.

b) The first Transparent Pass does the following: 1) at the beginning of the pass, *keep the Zfar value from the Opaque Pass*, and *set Znear to zero*; 2) identifies the back-most transparent surface between Znear (initialized to zero at the start of the pass) and Zfar; 2) *determine the new Znear value*, and, 3) at the end of the pass, send this back-most transparent surface down the pipeline.

c) The subsequent passes (second Transparent Pass, etc.) do the following: 1) at the beginning off the pass, *set the Zfar value to the Znear value from the last pass*, and *set Znear to zero*; 2) identify the next farthest transparent surface between Znear and Zfar; 3) *determine the new Znear value*; and, 4) at the end of the pass, send this backmost transparent surface down the pipeline.

In this excerpt, the buffers are never flipped. Instead, a copy operation occurs when the *value* of Zfar is set equal to the *value* of Znear. Setting the value of one buffer equal to the value of the other buffer is not flipping which buffer is considered as Zfar and which buffer is considered as Znear. It appears that Duluk's Zfar is always Zfar and its Znear is always Znear.

1 Accordingly, for at least this reason, this claim is allowable.

2 Claims 2, 7, and 8 stand rejected under § 102 over Duluk. However, given
3 the allowability of claim 1 over Duluk as discussed above, claims 2, 7, and 8 are
4 allowable as depending from an allowable base claim. These claims are also
5 allowable for their own recited features which, in combination with those recited
6 in claim 1, are neither disclosed nor suggested in Duluk.

7 Claims 3-6 also stand rejected under § 103 over Duluk. However, given
8 the allowability of claim 1 over Duluk as discussed above, claims 3-5 are
9 allowable as depending from an allowable base claim. These claims are also
10 allowable for their own recited features which, in combination with those recited
11 in claim 1, are neither discloses nor suggested by Duluk.

12 In making out a rejection of claim 6, the Office notes that Duluk does not
13 specify source buffer (Zfar) is only readable. The Applicant agrees. However, the
14 Office argues that it would have been an "obvious matter of design choice to
15 modify Duluk by having one of buffers is read-only." (Office Action dated
16 06/28/05, p. 6). The Applicant respectfully disagrees. Modifying Duluk so that one
17 buffer is read-only would render Duluk inoperable. Consider this excerpt from
18 column 33 of Duluk (which is reproduced above in its entirety in the Applicant's
19 claim 1 argument): "*set the Zfar value to the Znear value from the last pass, and*
20 *set Znear to zero.*" This excerpt clearly shows that Zfar and Znear must both be
21 writable. If *either* Zfar or Znear were only readable, then it would be impossible to
22 set the Zfar value to the Znear value *and* set the Znear value to zero. Accordingly,
23 to modify Duluk in a manner proposed by the Office would render Duluk
24 inoperable.
25

1 Accordingly, for at least these reasons, the Office has failed to make out a
2 *prima facie* case of obviousness. As such, this claim is allowable.

3 **Claim 9** has been amended, and as amended recites an apparatus
4 comprising [added language appears in the bold italics]:

- 5
- 6 • means for sorting, using multiple depth buffers, depth data
 - 7 associated with multiple transparent pixels that overlie one another
 - 8 to identify an individual pixel that lies closest to an associated
 - 9 opaque pixel;
 - 10 • means for computing a transparency effect of the identified pixel
 - 11 relative to the associated opaque pixel; and
 - 12 • means for identifying a next closest transparent pixel relative to the
 - 13 opaque pixel and computing, for the next closest pixel, a
 - 14 transparency effect relative to the transparency effect that was just
 - 15 computed; and
 - 16 • *wherein said means for sorting comprises means for flipping*
 - 17 *which of the multiple buffers is considered as a destination buffer*
 - 18 *and a source buffer*

19 In making out the rejection of claim 9, the Office again argues that this
20 claim is anticipated by Duluk. In light of the current amendments, Applicant
21 respectfully but strongly disagrees and traverses the Office's rejection for the same
22 reasons as discussed in claim 1.

23 Applicant respectfully submits that Duluk does not disclose or suggest
24 means for flipping which of multiple buffers is considered as a destination buffer
25 and a source buffer.

Accordingly, for at least this reason, this claim is allowable

Claim 10 stands rejected under § 102 over Duluk. However, given the
allowability of claim 9 over Duluk as discussed above, claim 10 is allowable as
depending from an allowable base claim. This claim is also allowable for its own

1 recited features which, in combination with those recited in claim 9, are neither
2 disclosed nor suggested in Duluk.

3 Claim 11 has been amended, and as amended recites a method comprising
4 [added language appears in the bold italics]:

- 5
- 6 • (a) rendering at least one opaque pixel that lies along a ray;
- 7 • (b) identifying a transparent pixel that lies along the ray, the
8 identified transparent pixel being the closest transparent pixel to the
9 opaque pixel;
- 10 • (c) computing transparency effects of the identified transparent pixel
11 relative to the opaque pixel;
- 12 • (d) if additional transparent pixels lie along the ray, identifying a
13 next closest transparent pixel relative to the opaque pixel and
14 computing transparency effects of the next closest pixel relative to
15 the computed transparency effects of a last computed transparent
16 pixel; and
- 17 • (e) repeating act (d) until transparency effects of all of the
18 transparent pixels along the ray have been computed in a back-to-
19 front manner;
- 20 • (f) *wherein acts (a)-(e) are performed utilizing two physical depth
21 buffers for sorting depth data associated with the transparent
22 pixels, and wherein the two depth buffers are configured to be
23 flipped.*
- 24
- 25

17 In making out the rejection of claim 11, the Office again argues that this
18 claim is anticipated by Duluk. In light of the current amendments, Applicant
19 respectfully but strongly disagrees and traverses the Office's rejection for the same
20 reasons as discussed in claim 1.

21 Applicant respectfully submits that Duluk does not disclose that the two
22 depth buffers are configured to be flipped as recited in this claim.

23 Accordingly, for at least this reason, this claim is allowable
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1 **Claims 14 and 27** stand rejected under § 102 over Duluk. However, given
2 the allowability of claim 11 over Duluk as discussed above, claims 14 and 27 are
3 allowable as depending from an allowable base claim. These claims are also
4 allowable for their own recited features which, in combination with those recited
5 in claim 11 are neither disclosed nor suggested in Duluk.

6 **Claims 15-17 and 22-26** stand rejected under § 103 over Duluk. However,
7 given the allowability of claim 11 over Duluk as discussed above, claims 15-17
8 and 22-26 are allowable as depending from an allowable base claim. These claims
9 are also allowable for their own recited features which, in combination with those
10 recited in claim 11 are neither disclosed nor suggested in Duluk.

11 In making out a rejection of claims 22-26, the Office uses the same
12 argument that they did in rejecting claims 3-6. Again, the Applicant respectfully
13 disagrees. Modifying Duluk so that one buffer is read-only would render Duluk
14 inoperable, as pointed out above. Accordingly, to modify Duluk in a manner
15 proposed by the Office would render Duluk inoperable.

16 Accordingly, for at least these reasons, the Office has failed to make out a
17 *prima facie* case of obviousness. As such, this claim is allowable.

18 **Claim 28** has been amended, and as amended recites a system comprising
19 [added language appears in the bold italics]:

- 20
- 21 • means for rendering at least one opaque pixel that lies along a ray;
- 22 • means for identifying a transparent pixel that lies along the ray, the
23 identified transparent pixel being the closest transparent pixel to the
24 opaque pixel;
- 25 • means for computing transparency effects of the identified
 transparent pixel relative to the opaque pixel; and
- means for identifying, in a back-to-front manner, additional
 transparent pixels and successively computing transparency effects

1 for the additional transparent pixels, *wherein said means for*
2 *identifying comprises a pair of physical depth buffers that can be*
3 *logically flipped.*

4 In making out the rejection of claim 28, the Office again argues that this
5 claim is anticipated by Duluk. In light of the current amendments, Applicant
6 respectfully but strongly disagrees and traverses the Office's rejection for the same
7 reasons as discussed in claim 1.

8 Applicant respectfully submits that Duluk does not disclose a pair of
9 physical depth buffers that can be logically flipped as recited in this claim.

10 Accordingly, for at least this reason, this claim is allowable

11 Claim 29 stands rejected under § 102 over Duluk. However, given the
12 allowability of claim 28 over Duluk as discussed above, claim 29 is allowable as
13 depending from an allowable base claim. This claim is also allowable for its own
14 recited features which, in combination with those recited in claim 28, are neither
15 disclosed nor suggested in Duluk.

16 Claim 32 recites a system comprising [emphasis added]:

- 17
- 18 • a transparent depth sorting component comprising:
 - 19 ○ at least two physical depth buffers;
 - 20 ○ *a writeback counter to count writebacks that occur to at*
21 *least one of the two physical depth buffers; and*
 - 22 ○ comparison logic that is configured to effect:
 - 23 ■ sorting, using said at least two physical buffers, of
24 depth data associated with multiple transparent
25 pixels that overlie one another to identify an
individual pixel that lies closest to an associated
opaque pixel;
 - computing a transparency effect of the identified
pixel relative to the associated opaque pixel;
 - after said computing, identifying a next closest
transparent pixel relative to the opaque pixel; and

- computing, for the next closest pixel, a transparency effect relative to the transparency effect that was computed for the said closest individual pixel and the associated opaque pixel.

In making out a rejection of this claim, the Office argues that Duluk discloses most of the recited features. However, the Office admits that Duluk does not disclose a writeback counter as claimed. The Applicant agrees. The Office argues that it would have been an *obvious matter of design choice* to modify Duluk by having a writeback counter to count writebacks that occur to at least one of the two physical depth buffers since applicant has not disclosed that having the writeback counter solves any stated problem and it appears that the buffers would perform equally well with the Z cull unit which determines when all the sorting and rendering of samples for the fragment have been all processed. The Applicant disagrees.

In this case, the Office has used hindsight reconstruction by looking at the claimed subject matter, and stating that it would have been obvious design choice to modify the prior art with the claimed subject matter. This is quite vague indeed. The Office has failed to give a reason why one would modify Duluk by adding a writeback counter as claimed. Accordingly, the Office has failed to establish a *prima facie* case of obviousness, and this claim is allowable.

Claims 33-40 depend from claim 32 and are allowable as depending from an allowable base claim. These claims are also allowable for their own recited features which, in combination with those recited in claim 32, are neither disclosed nor suggested by Duluk.

1
2 **Conclusion**

3 All of the claims are in condition for allowance. Accordingly, Applicant
4 requests a Notice of Allowability be issued forthwith. If the Office's next
5 anticipated action is to be anything other than issuance of a Notice of Allowability,
6 Applicant respectfully requests a telephone call for the purpose of scheduling an
7 interview.

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9 Respectfully submitted,

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